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   RESEARCH METHODOLOGY

   RESULTS & DISCUSSION

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# COMPOSITION OF INTERNATIONAL RESERVES AND ITS COLLISION ON EXCHANGE RATE AND GROSS DOMESTIC PRODUCT IN INDIA

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**ABSTRACT**

*International Reserves has gained significance over the past two decades either as a precautionary motive or transaction motive. The countries, most particularly, developing nations shown much interest in holding reserves than developed nations. The reason behind this was, having more reserves in their treasury can certainly raise their worthiness among other nations. The Indian international reserves has grown and been growing since the introduction of liberalization policy 1991, at a rapid pace. The present study tries to analyse whether the pace of international reserves have concerned effect on Exchange Rate and Gross Domestic Product in India after 1991 or not. The study further attempted to find out the evaluation of long run relationship exists between international reserves, Exchange Rate and Gross Domestic Product. The study identified the positive long run relationship exists between the international reserves Exchange Rate and Gross Domestic Product in India. Hence, the international reserves accumulation having impact on Gross Domestic Product and Exchange Rate in India.*

**KEYWORDS**
International reserves, Precautionary motive, Transaction motive, Exchange Rate and Gross Domestic Product.

**JEL CLASSIFICATION CODE**
F31, F39.

## I. INTRODUCTION

International Reserves or External Reserves are foreign currencies, foreign deposits and bonds held by Central Banks and monetary authorities of a nation that includes gold and silver, Special Drawing Rights (SDRs) and International Monetary Fund (IMF) reserves positions. Any nation would need International reserves to coordinate its receipts and payments with the rest of the world and to survive occasional speculative raid by dealers in speculative market. The use of International Reserves has become more popular after the decline of gold standards. Indian International Reserves shored up especially after liberalization policy announced in 1991. The Exchange Rate regime of India, since the increasing trend of foreign reserves has faced fluctuations from time to time. The excessive accumulation of foreign reserves is been beyond absorption capacity and has distorted the primary ratios which are theoretically optimized. The present study tries to estimate whether such un-precedent levels of foreign reserves have a bearing on the Exchange Rates and Gross Domestic Product, which otherwise would have a cascading effect.

## II. PROBLEM STATEMENT

In today's world, large foreign reserves and its strengthened balance of payments symbolizes the country's strength and worth, as it indicates the strong backing the currency of the country has. Hence, it attracts the assurance of global society present inside the country, as well as in the globe towards the country while a low foreign reserves signal the opposite. It is then necessary for the rising financial system to hold large foreign reserves against disruptive effect of abrupt capital outflows. Looking at some of the domestic and external economic indicators, India seems to have come a long way since the 1991 balance of payment crisis. However, the crisis paved way for supplementary liberalization of the economy and since then trade; Foreign Investment and Exchange Rate reforms have been undertaken leading to a surplus on capital account. Apart from the surge in these capital inflows, RBI has been resistant to Exchange Rate appreciation to protect exports, though India is a domestic demand driven economy, and structural factors more than currency value constrain export growth. This has resulted in the rapid growth in foreign reserves from a mere $5.8 billion in 1991 (Fiscal Year in India is from April- March) to a high of $291 billion by Feb 2013.

Hence, in India, overseas venture followed by exterior commercial borrowings of home firms in 1990-1991 has led to rise in accretion of foreign reserves. India's history of foreign reserves accumulation has its own history. It faced both accelerating and decelerating trend since 1950s. The growth of accumulation of foreign reserves by the nation is extreme during the last two decades competing the global growth, i.e., since 1991. These accumulations are made regardless of whatever effects they have on the Exchange Rate and Gross Domestic Product. This study, therefore, assesses foreign reserves and its impact on Exchange Rate and Gross Domestic Product during the last two decades. Hence the study tends to seek answers for the following questions:

- Whether there is a long run relationship exists between International Reserves, Exchange Rate and Gross Domestic Product of India?
- How far the accumulation of International Reserves affected Exchange Rate?
- What is the impact of International Reserves on Gross Domestic Product?

## III. REVIEW OF LITERATURE

**Shromon Das (2008)**[1], in his article, has agreed that India's foreign exchange reserve have been growing at a rapid pace. He had authentically seen how RBI published a data on sources of accretion to International Reserves in India, which are main components to our International Reserves, along with their values. The data proves how the components have undergone maximum change in the capital account, owing largely to net portfolio inflows.

**Muhammad Tohir Khan (2013)**[2], by his study, models the relationship and causality link between International Reserves and Exchange Rate for economy of Pakistan using annual data series from 1983 to 2009 by applying Co Integration analysis. The study also examines the causality relationship and also suggests that, in Pakistan both the Nominal Exchange Rate and Real Exchange Rate affects the International Reserves.

**Umeora Chinweobo Emmanuel (2013)**[3], found in his study the effects of holding International Reserves on Exchange Rates and inflation in Nigeria. The study found no relationship between inflation and foreign reserves and found a significant relationship between Exchange Rate and foreign reserves. Government is

advised to ensure optimal management of the nations external reserves. Other causes such as Money Supply (M2) are suspected to be responsible for causing inflation in Nigeria.

## IV. OBJECTIVES OF THE STUDY

The objectives of the study are:

- To identify the long run relationship between International Reserves, Exchange Rate and Gross Domestic Product.
- To evaluate the impact of International Reserves on Exchange Rate and Gross Domestic Product during the study period.

## V. SCOPE OF THE STUDY

The study has been attempted to analyse impact of International Reserves on foreign Exchange Rate and Gross Domestic Product. It does not cover volatility or cost benefit analysis of the foreign reserves or Exchange Rate or Gross Domestic Product.

## VI. HYPOTHESES OF THE STUDY

The hypotheses framed for the study are:

- **$H_{01}$**: International Reserves, Exchange Rate and Gross Domestic Product have no long run relationship among themselves
- **$H_{02}$**: International Reserves has no impact on Exchange Rate.
- **$H_{03}$**: International Reserves has no impact on Gross Domestic Product.

## VII. METHODOLOGY FOR THE STUDY

**A. SOURCES OF DATA**

The study is based on secondary data and the reliable data for the study has been compiled from the Statistical handbook of Indian economy of Indian Central Government and World Bank database.

**B. PERIOD OF STUDY**

The study period is 23 years from 1990-1991 to 2012-2013.

**C. TOOLS USED**

The collected data have been used for analysis with the help of both econometric and statistical tools. The statistical tool used is Regression and the econometric tools used are unit root test (Augmented Dicky Fuller Test) and Johansen Co Integration test.

- **Unit root test**

In order to examine the data integration level and stationary the classical unit root test called Augmented Dicky Fuller (ADF) test has been used. It is so because the ADF test is more reliable for testing the non stationary of data series. A variable which have constant mean and variance with respect to time called stationary variable, when a variable is non stationary it requiring first-order differencing to achieve stationery. There are three types of different regression form of ADF unit root test for every time series data.

**(I) Without Intercept (c) and Trend (t): $\Delta Y = \delta Yt\text{-}1 + ut$**

**(II) With Intercept (c): $\Delta Y = \alpha + \delta Yt\text{-}1 + ut$**

**(III) With Intercept (c) and Trend (t): $\Delta Y = \alpha + \beta T + \delta Yt\text{-}1 + ut$**

In the above regression equations each equation has its own critical value which depends on sample size, and in each case the null hypothesis:

**Ho: $\delta = 0$**

**H1: $\delta \neq 0$**

Decision rule for accepting or rejecting the null hypothesis are:

(i) If ADF test statistic > critical value, the null hypothesis cannot be rejected, it means that a unit root exists (no stationarity).

(ii) If ADF< critical value, the null hypothesis can be rejected, it means that the unit root does not exists (stationarity).

- **Johansen Co Integration test**

Johansen Co Integration analysis is a statistical analysis used for time series data for determining long run relationship between two or more variables. It is done to identify the integration among variables. After stationary of the variable is found, the next step is to identify the integration among the variables. For the purpose, there are two basic co integration techniques can be used. One is (Engle and Granger 1987) two step Co Integration procedure and the other is Johansen Co Integration test to test the integration among the variables based on trace statistics and Max Eigen value statistics.

## VIII. SIGNIFICANCE OF THE STUDY

International Reserves are now accumulated regardless of the opportunity cost and effect on the economies especially in low income and developing countries. India, being a developing nation has been accumulating foreign reserves at a rapid pace against all odds. The accumulation has been made for many reasons as political, financial or economical. Above all needs, India stands among the top ten nations in foreign reserve holdings. The study analysed the foreign reserves impact on Exchange Rate, which has its implications with benefits to policymakers, academicians and information seekers.

## IX. LIMITATIONS OF THE STUDY

The major limitations of the study are;

- Since the IMF reserve position was included only after fiscal year 2002-2003, it does not have effect on the study before inclusion.
- The study is made only in consideration with India and not applicable to any part of the globe.
- The study fully depends on the secondary data, which has its own limitations.

## X. ANALYSIS OF IMPACT OF INTERNATIONAL RESERVES ON EXCHANGE RATE AND GROSS DOMESTIC PRODUCT USING REGRESSION ANALYSIS

**A. AUGMENTED DICKY FULLER UNIT ROOT TEST OF EXCHANGE RATE, INTERNATIONAL RESERVES AND GROSS DOMESTIC PRODUCT**

**TABLE – I: AUGMENTED DICKY FULLER UNIT ROOT TEST**

| Variables | t – statistic (level) | Probability* | t – statistic (1st difference) | Probability* |
|---|---|---|---|---|
| **RESERVES** | -2.4489 | 0.3473 | -5.9837 | 0.0692 |
| **RATE** | -4.7597 | 0.6592 | -6.8252 | 0.0049 |
| **GDP** | -4.1136 | 0.0195 | -5.8599 | 0.0000 |

*****MacKinnon p-values

**Source :** Compiled and calculated from Statistical Handbook of Indian Economy 2013 and World Bank.

The table 1 reveals the Augmented Dicky Fuller unit root test for finding stationary of International Reserves, Exchange Rate and Gross Domestic Product of India during the period from 1990-1991 to 2012-2013. The stationary of all the variables are proved at the first difference with the t-statistic values of -5.9837, -6.8252

and -5.8599 for International Reserves, Exchange Rate and Gross Domestic Product respectively, which is smaller than the critical values. Hence, the unit root does not exists and the stationarity of variables is proved.

**$H_{01}$: International Reserves, Exchange Rate and Gross Domestic Product have no long run relationship among themselves**

**B. JOHANSEN CO INTEGRATION TEST ANALYSIS FOR INTERNATIONAL RESERVES, EXCHANGE RATE AND GROSS DOMESTIC PRODUCT**

**TABLE – II: JOHANSEN CO INTEGRATION TEST**

**Unrestricted Cointegration Rank Test (Trace)**

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.795930 | 40.89750 | 29.79707 | 0.0018 |
| At most 1 | 0.274796 | 17.52240 | 15.49471 | 0.5178 |
| At most 2 | 0.036235 | 0.77506 | 3.841466 | 0.3787 |

**MacKinnon-Haug-Michelis (1999) p-values

**Unrestricted Cointegration Rank Test (Maximum Eigenvalue)**

| Hypothesized No. of CE(s) | Eigenvalue | Max-Eigen Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.795930 | 33.37510 | 21.13162 | 0.0006 |
| At most 1 | 0.274796 | 16.74733 | 14.26460 | 0.5194 |
| At most 2 | 0.036235 | 0.77506 | 3.841466 | 0.3787 |

**MacKinnon-Haug-Michelis (1999) p-values

**Source :** Compiled and calculated from Statistical Handbook of Indian Economy 2013 and World Bank

The table 2 indicates the Johansen Co Integration test for International Reserves, Exchange Rate and Gross Domestic Product of India during the study Period from 1990-1991 to 2012-2013. The Trace statistics and Max Eigen value statistics shows the value greater than the Mackinnon p-values at 5% level at None and At most 1. Hence, the null hypothesis is rejected and found that there is a long run relationship between the three variables during the study period.

**$H_{02}$: International Reserves has no effect on Exchange Rate in India.**

**c.Regression analysis of International Reserves and Exchange Rate during the period 1990-1991 to 2012-2013**

**TABLE – III: MODEL SUMMARY**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Sig/Non-significance |
|---|---|---|---|---|---|
| 1 | .831[a] | .690 | .675 | .05802 | Significant |

a. Predictors: (Constant), RESERVES

**Source :** Compiled and calculated from Statistical Handbook of Indian Economy 2013 and World Bank.

The table 3 represents the regression analysis between International Reserves and Exchange Rate for the study period between 1990-1991 and 2012-2013. The analysis placed Exchange Rate as dependent variable and International Reserves independent variable. The analysis shows $R^2$ value of 0.690, which states that the International Reserves contributed highly for the growth of Exchange Rate in India. The calculated F value is more than the table value and hence, the null hypothesis is rejected and there is a significant effect by International Reserves on Exchange Rate during the study period.

**$H_{03}$: International Reserves has no effect on Gross Domestic Product in India.**

**C. Regression analysis of International Reserves and Gross Domestic Product during the period 1990-1991 to 2012-2013**

**TABLE – IV: MODEL SUMMARY**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Significance/Non-significance |
|---|---|---|---|---|---|
| 1 | .516[a] | .567 | .232 | .15901 | Significant |

a. Predictors: (Constant), RESERVES

**Source :** Compiled and calculated from Statistical Handbook of Indian Economy 2013 and World Bank.

The table 4 shows the regression analysis between International Reserves and Gross Domestic Product for the study period between 1990-1991 and 2012-2013. The analysis placed Exchange Rate as dependent variable and International Reserves independent variable. The analysis shows $R^2$ value 0.567, which states that the foreign reserves contributed significantly for the Gross Domestic Product in India during the study period. The calculated F value is greater than the table value and hence, the null hypothesis is rejected and there is a significant effect by International Reserves on Gross Domestic Product during the study period

## XI. FINDINGS

The major findings of the study are:

- The variables, International Reserves, Exchange Rate and Gross Domestic Product have a significant long-run relationship among themselves during the study period.
- The International Reserves accumulation has a significant impact on Exchange Rate during the study period.
- The International Reserves accumulation has a significant impact on Gross Domestic Product during the study period.

## XII. SUGGESTIONS

The suggestions based on findings are:

- The International Reserves accumulation has a significant contribution on Exchange Rate and so the country can continue holding foreign reserves to have stabilised Exchange Rates, which would boost the credit ratings and in turn would draw investors to India in the form of foreign direct investment and portfolio investments and thereby supplying the much needed capital for stimulating Gross Domestic Product.

- The holdings of International Reserves can have the ability to raise the economy of the nation and hence, it can be suggested to continue holdings to meet the internal needs of the nation such as industrial development and infrastructure development.

## XIII. CONCLUSION

The International Reserves accumulation, thus from the study have posed significant effect on Exchange Rate and Gross Domestic Product in India. The largest reserve holders have far exceeded defensive levels of International Reserves by most rational measures. Rather, most excess reserve accretion appears in nations with Exchange Rates strongly fixed to the U.S. dollar, and the longing to limit Exchange Rate elasticity likely underlies much of the modern reserve accumulation. Though economists at various views suggests the wrong points of accumulating huge reserves, Indian government keeps on holding more reserves. This may be utilized properly to attain benefits.

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